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MEASURING THE INFORMATION SOCIETY IN EUROPE: FROM DEFINITIONS TO DESCRIPTION

ABSTRACT

Constructing a comprehensive set of IS indicators requires a sound definition of the Information Society to establish meaningful benchmarks and to measure change. The task becomes complicated as it seems that IS is more or less 'undefined' at the moment. This means that IS is what one wants it to be: countries held as "information societies" are those countries, which people think of being such – and not defined by, for example, achieving a level measured by some quantitative IS-related indicators.

The aims of this article are to examine how the evolution of the information society has been measured, and to relate European territories with each other by providing an information society index for the NUTS2 level.

Results show that despite the lack of a clear and single definition of Information Society (IS) one can derive some conclusions about what IS consists of by taking a look at previous IS projects having collected IS indicators. They indicate three different levels of IS. These levels range from the narrow technological and the intermediate techno-economic definitions to the broad, all-inclusive IS definition. As a result, the paper also presents an synthetic IS indicator which benchmarks NUTS2 territories for selected European countries.

1 INTRODUCTION

Information Society (IS) indicators describe the level of information society development achieved in a particular society in quantitative terms. They can serve a range of purposes related to providing a view of the society's state: for example, following the evolution of IS or benchmarking IS with other territories. By considering changes over time, IS indicators also comprise a critical tool in the monitoring, evaluation and improvement of IS policy. Inevitably, the primary benefit of indicators lies in this capacity to guide policy-makers into proactive thinking i.e. to focus their attention on future priorities.

Constructing a comprehensive set of IS indicators requires a sound definition of the Information Society to establish meaningful benchmarks and to measure change. The task becomes complicated as it seems that IS is more or less 'undefined' at the moment. This means that IS is what one wants it to be: countries held as "information societies" are those countries, which people think of being such – and not defined by, for example, achieving a level measured by some quantitative IS-related indicators.

Despite the obvious need for information society indicators, there seems to be a lack of an indicator measuring the territoriality of the IS. This paper provides such a measure for the NUTS2 regions in 29 European countries. The aims of the paper are to examine how the evolution of the information society has been measured, and to relate European territories with each other by these measures.

The paper proceeds as follows: In the next section, the concept of IS is discussed by having a look at different IS projects conducted in Europe. The third section takes a look at the development of IS on the national level. Thereafter the calculation of the territorial indicator is presented in section 4. Section 5 ends the paper by providing some conclusions of this study.

This article is an outgrowth of the ESPON project "Identification of Spatially Relevant aspects of the Information Society", which has guided the country selection to the 29 member countries. (www.espon.lu)

2 DEFINING THE INFORMATION SOCIETY

While IS is actually a very recent phenomena, numerous empirical projects have aimed to empirically measure and quantitatively monitor different aspects of it. This substantial body of work has been carried out by various actors: supranational organisations, national statistical offices, research projects, consultant agencies etc. In order to get an insight on how the "territorial dimension" has been acknowledged, a review for the recent work in this field was undertaken. Table 1 presents a sample of projects having collected IS indicators in the ESPON space since year 2000, complemented with a regional analysis of the Nordic countries and a Finnish IS project.

Table 1. Sample of information society indicator projects in the EU. See Appendix 1 for sources.

Regional focus	Project	Year	Territorial level	Source
EU country	ESIS	2000	EU15, NUTS0	Public sources
	SIBIS	2002	EU15, partly EU27, NUTS0	Interviews
	Eurobarometer	2002	EU15, NUTS0	Interviews
	Eurostat InfoSoc Pocketbook 2003 edition	2002	EU15, NUTS0	Interviews
	E-Business Market Watch	2005	7 EU countries, NUTS0	Interviews
EU territories	BISER	2003	28 NUTS2 regions in EU15	Interviews
	INRA	2004	EU15, partly NUTS2	Interviews
	ESPON Telecom	2004	EU25+2+2, partly EU15 NUTS0, partly NUTS2	Previous projects, simulation
Nordic countries	Nordic Information Society Indicators	2002	4 Nordic countries, capital vs. other regions	Interviews
Finland	Statistics Finland	2002	Finland, NUTS3	Interviews

Table 1 reveals that several different actors have been working with IS indicators simultaneously in Europe in recent years. While many of these projects may be considered pioneering work in this field, the somewhat overlapping attempts may also indicate a poor coordination in this very first phase of collecting the IS data on the European or the EU level. Another distinctive feature is the common methodological approach of collecting the data via interviews, indicating that the up-to-date and publicly-available statistical sources are either of inadequate quality or totally lacking. The two projects which use public sources use either the indicators of previous projects (ESPON 1.2.2) or collect their indicators on a country level (ESIS).

For the EU25, member countries' statistical offices, Eurostat, and more recently, EU DG Infosoc do nowadays provide selected information society indicators. However, territorial data is not commonly available through these sources as they concentrate on the country level. Some projects have collected territorial IS indicators, but the methodologies used tell the same story: they have to collect their data themselves in order to receive territorial IS indicators. For example, the ESPON 'Telecom' project (Curds et al. 2004) analyzed the availability of telecommunications and also other IT, which can be regarded as belonging to the technological aspect of the IS. The project used information from Eurostat and INRA, of which the latter provided information on a territorial level for EU15 member countries. For the rest of the ESPON countries the indicators were simulated. As the technological aspect – the availability and use of IT technologies – is inevitably the most monitored IS indicator, the poor data-availability on a territorial level in the ESPON space clearly manifests that other IS indicators are even harder to find.

Table 1 also shows that the projects on the EU level have tended to broaden from including EU15 to include EU25 and even more countries. Moreover, it seems that the territoriality of IS has become of interest only recently. As collecting a territorially representative sample by conducting interviews requires remarkable efforts, the task seems to have been reduced either to cover only selected regions from the observed countries (BISER), or by calculating IS indicators on the basis of other available data (ESPON Telecom, Curds et al. 2004). Moreover, the only country specific project in Table 1, measuring the state of the IS in Finland, collected data on the NUTS3 level. The projects looking at multiple countries have collected territorial IS data either at the NUTS2 level or compared the capital region with the rest of the country. International projects seem to be not that interested in lower than country level indicators.

The conclusions from this review are the following: i) While the situation is improving, there has been no coordinated collection of IS indicators; and ii) Territorial data measuring the IS is not available for the whole EU space. Reasons are probably the lack of coordinated collection of IS indicators and the lack of resources needed to collect a territorially representative sample.

Moreover, the vague definition of the term Information Society mentioned in the Introduction is reflected by the collected IS indicators. Table 2 presents the number and categories of indi-

cators collected by the six selected projects. The collected number of IS indicators varies from 7 to 145, and one reason behind the difference in the number of indicators collected is the definition of IS. The used indicator categories reflect the projects' views of what the term information society actually means.

Table 2. Number of indicators and indicator categories in six information society indicator projects.

Project (Year)	**ESIS (2000)**	**Eurostat (2003)**	**BISER (2003)**	**INRA (2004)**	**ESPON Telecom (2004)**	**Statistics Finland (2003)**
No of Indicators	30	34	145	10	7	28
Indicator categories	• Telecom markets • Telephone lines • Telecom equipment • Telecom prices • Personal computers • Internet • Television	• ICT sector • ICT market and external trade • ICT penetration • ICT usage in households • ICT usage in enterprises • ICT and education, training and skills • ICT government and health	• eGovernment • Transport • Healthcare • Regional identity • Business enterprise • Innovation and R&D • Work • Education, training and skills • Social inclusion • ICT infrastructure	• Fixed and mobile telephony • Internet	• Mature ICT availability and use • Broadband, e-commerce and Internet backbone	• Views of information society • Usage of phones, computer and internet • Usage of computers and IT networks in schools • IT at work • eGovernrment • Differences of ICT usage on the NUTS3 level

Following the approach of Webster (1995), three different views of IS can be derived from the categories: 1) broad; 2) intermediate; and 3) narrow view of IS.

1. The broad view follows Webster's original conceptualization of the information society into five definitions: technological, economic, occupational, spatial, and cultural. All these aspects are included in this broad view as well as spatial and cultural features such as regional identity and social cohesion and inclusion. Out of the projects listed, this view is represented by BISER.
2. The intermediate view of IS includes technological and economic indicators in the data collection, such as the size of ICT sector, market and external trade. It also includes indicators measuring IT at the workplace, the state of eGovernment and health. This view is best represented by statistical agencies: Eurostat and national statistical offices.

3. The narrow view of IS defines the IS technologically as it looks at the availability and usage of different ICT technologies (ECIS, INRA, ESPON Telecom). By doing so, the indicators measure the 'digital divide', the difference between the amount of users and non-users. This view relates with Webster's technological definition of the IS.

3 SPATIAL PATTERNS OF THE INFORMATION SOCIETY IN EUROPE

The life-cycle framework provided by the OECD suggests that various IS indicators can be interpreted in terms of evolutionary stages of IS (see Figure 1). The lifecycle of IS is seen to range from the stage of readiness and intensity to that of impact. In the first stage only enabling factors are of importance, whereas in the later stages, the availability, use and impact of IS (e.g. technologies) gain prominence. Comparing this setting with Table 1, it can be argued that the presented indicators are mostly linked with the intensity stage of IS, but some of them can also be seen to measure impacts: the economic part focusing on the operational restructuring, and the purpose of use on the social inclusion and participation.

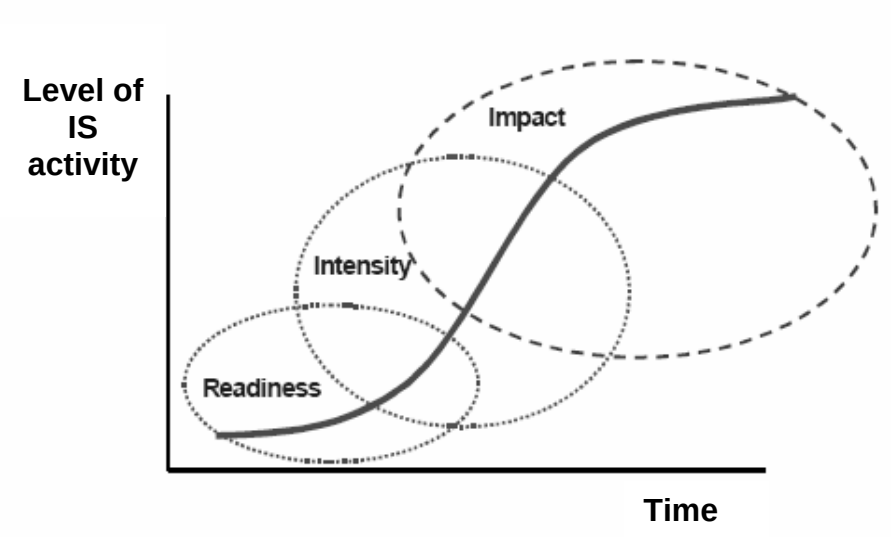


Figure 1. Life-cycle of Information Society. (Source: OECD 1999 with some modifications).

The life-cycle approach has also been applied in the collection of IS indicators (Statistics Finland 2005). In this framework the readiness phase of IS includes, for example, indicators measuring the availability of ICT infrastructure, and opportunities and skills needed for using ICT, such as general computer skills. The intensity or growth phase concentrates on the cov-

erage and means of ICT use; the relevant indicators measure, for instance, computer, internet and e-mail penetration. In other words, these two phases largely focus on measuring the digital divide and the knowledge gap - the phenomenon that some people have better access to ICT and information than others. The third, impact or outcome phase, measures the operational restructuring caused by the use of ICT, and in the social inclusion and participation in the IS.

Irrespective of its limitations, the life-cycle approach reveals the methodological and practical difficulties associated with the comparisons between the countries at different stages of IS development. In international comparisons, the indicators should take into consideration the complex dynamics of IS development – the specificity of each IS indicator category in each country in each point of time – and combine all this information into a synthetic measure.

There are only a few such indices available, describing the characteristics of IS in European countries. Perhaps the most comprehensive ones are the ITU Digital Access Index (DAI) from 2002, the eEurope Index from 2004 and the Network Readiness Index (NRI) provided by the World Economic Forum in 2005. In the following we take a closer look at the two most recent indices, the eEurope Index and the Network Readiness Index. These indices are so-called composite indices, which summarize the information of several indicators or sub-indices in order to give an overall picture of the state of Information Society in a country. The overall aim is to compare the countries in terms of IS performance.

The eEurope 2005 Index is calculated for 28 countries, aiming to benchmark the new member states and the candidate countries with the EU15 countries. Thus, for example, it includes Turkey but excludes Norway and Switzerland. The composite index is an average of the following five sub-indices: Internet Indicators, Modern Online Public Services, Dynamic Business environment, Secure Information Infrastructure, and Broadband. Appendix 2 provides a more detailed description of the index. (INSEAD 2004)

These sub-indices are developed to suit for the needs of the e-Europe 2005 action plan. The action plan manifests that by the year 2005 member states should have a widespread broadband availability and a secure information infrastructure for a dynamic e-business environment and modern online public services. The data for the indicators was derived from several international statistical sources, including the World Bank, Pyramid Research, ITU and the

World Economic Forum. The eEurope 2005 index is measured on a scale from 1 to 7. Figure 2 represents the contents of the eEurope 2005 index. (INSEAD 2004)

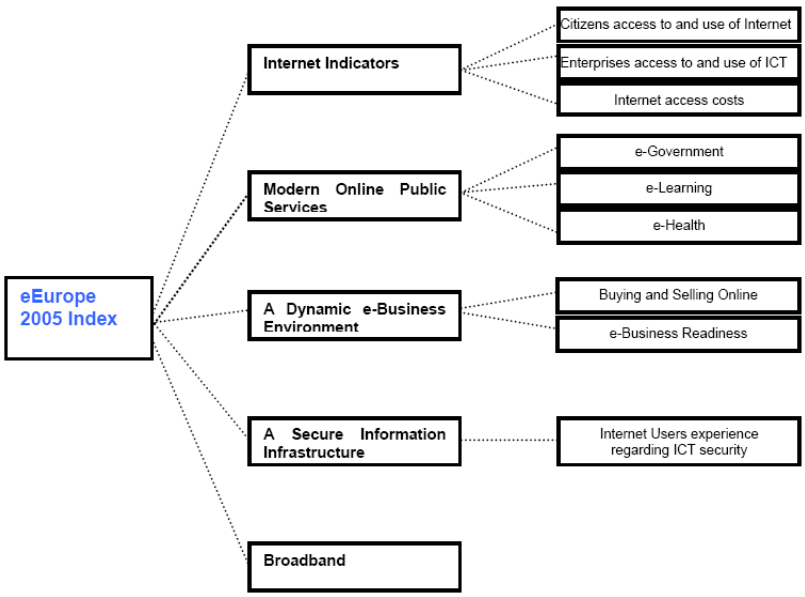


Figure 2. The eEurope 2005 Index. (Source: INSEAD 2004).

The Networked Readiness Index (NRI, WEforum 2004, 2005) looks at 104 economies, including all 29 ESPON countries. The NRI is formed of the three main categories: the environment for ICT development consisting of market environment, political and regulatory environment and infrastructure environment, the ICT readiness of individual, business and government sector, and the ICT usage of these three sectors. The data for the index is collected by questionnaires managed by the WEforum and by statistics from international agencies. The index is measured on a seven point scale, previously from 1 to 7 (WEforum 2004) and recently from -3 to 3 (Weforum 2005). Figure 3 represents the composition of the index, and Appendix 2 shows the contents of the index in detail.

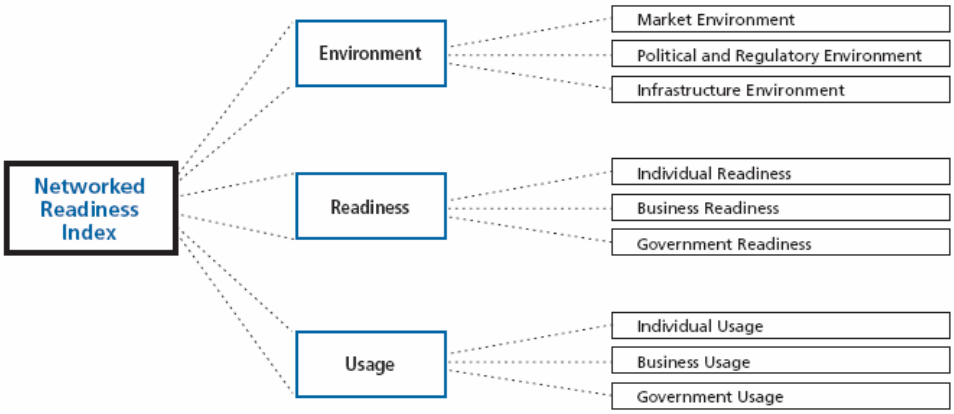


Figure 3. The Networked Readiness Index. (Source: WEforum 2004).

The scores of the 29 European countries for the two above mentioned index are presented in Table 2. The indices are found to be highly correlated (r = 0.91). The difference and the average of the two indices are also presented in Table 2. In the following analysis, the average of the eEurope and the NRI indices is used as an IS composite index (scaled from 0 to 1).

Table 2. Scores of the eEurope and NRI indices for 29 European countries.

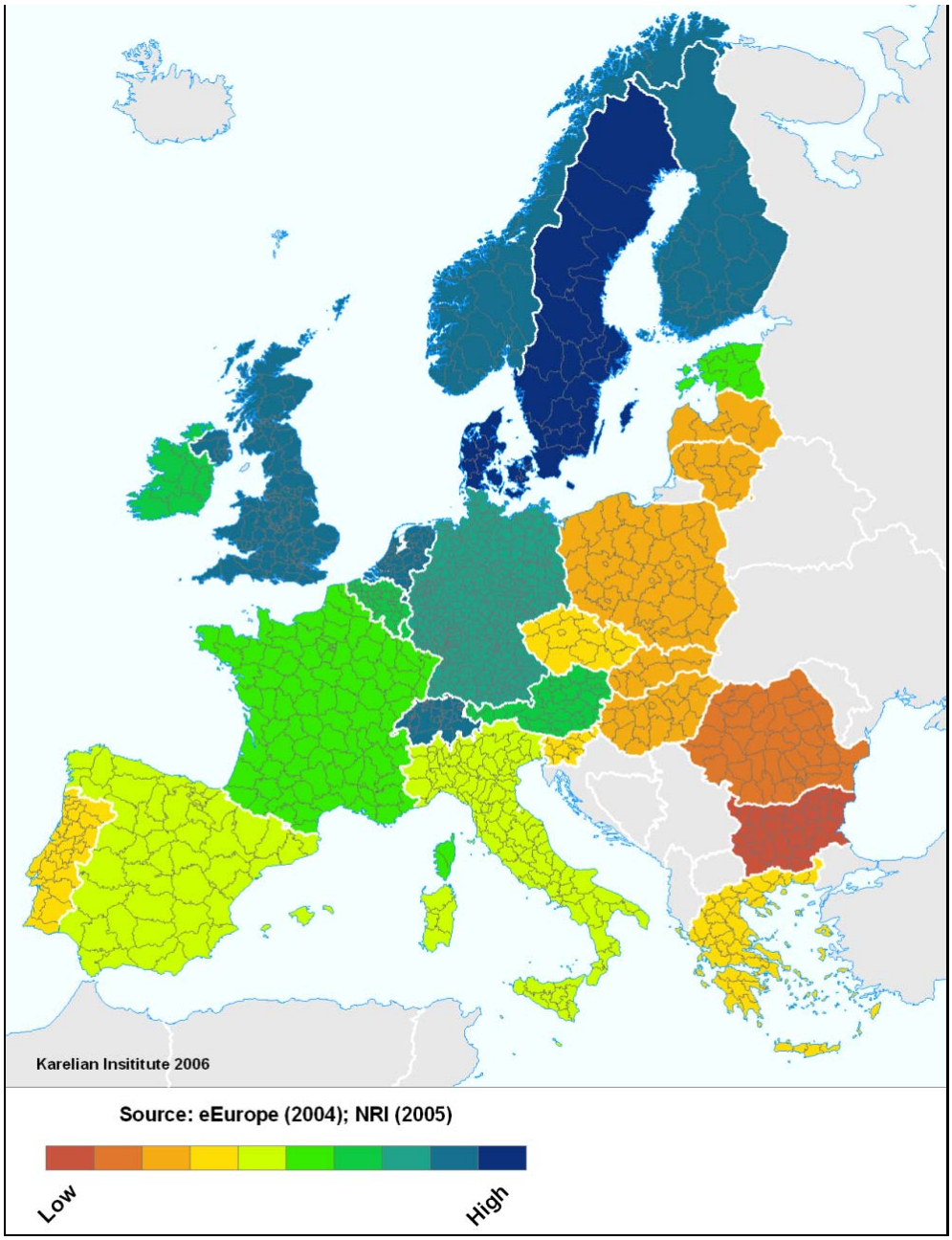
	e-Europe 2005		**NRI**		**DIFFERENCE**	**AVERAGE**
	INSEAD (2004)	(Scale: 0-1)	WEForum (2005)	(Scale: 0-1)	(Scale: 0-1)	(Scale: 0-1)
Austria	4,64	0,61	1,01	0,67	-0,06	0,64
Belgium	4,56	0,59	0,74	0,62	-0,03	0,61
Bulgaria	1,82	0,14	-0,51	0,42	-0,28	0,28
Cyprus	2,72	0,29	0,25	0,54	-0,26	0,41
Czech Republic	2,78	0,30	0,21	0,54	-0,24	0,42
Denmark	5,9	0,82	1,6	0,77	0,05	0,79
Estonia	3,74	0,46	0,8	0,63	-0,18	0,55
Finland	4,92	0,65	1,62	0,77	-0,12	0,71
France	3,86	0,48	0,96	0,66	-0,18	0,57
Germany	4,85	0,64	1,16	0,69	-0,05	0,67
Greece	3,14	0,36	0,17	0,53	-0,17	0,44
Hungary	2,22	0,20	0,24	0,54	-0,34	0,37
Ireland	4,41	0,57	0,89	0,65	-0,08	0,61
Italy	3,91	0,49	0,1	0,52	-0,03	0,50
Latvia	2,62	0,27	-0,23	0,46	-0,19	0,37
Lithuania	2,4	0,23	0,13	0,52	-0,29	0,38
Luxembourg	4,27	0,55	1,04	0,67	-0,13	0,61
Malta	3,77	0,46	0,5	0,58	-0,12	0,52
Netherlands	5,28	0,71	1,08	0,68	0,03	0,70
Norway	-	-	1,19	0,70	-	0,70
Poland	2,78	0,30	-0,5	0,42	-0,12	0,36
Portugal	3,17	0,36	0,39	0,57	-0,20	0,46
Romania	1,99	0,17	-0,15	0,48	-0,31	0,32
Slovak Republic	2,67	0,28	0,03	0,51	-0,23	0,39
Slovenia	2,86	0,31	0,37	0,56	-0,25	0,44
Spain	3,65	0,44	0,43	0,57	-0,13	0,51
Sweden	5,36	0,73	1,53	0,76	-0,03	0,74
Switzerland	-	-	1,3	0,72	-	0,72
United Kingdom	5,24	0,71	1,21	0,70	0,01	0,70
AVERAGE	3,69	0,45	0,61	0,60	-0,15	0,53

The contents of the two indices can be compared by taking a look at Figures 2 and 3 (full descriptions are given in Appendix 2). In comparison to the NRI, the eEurope index considers the availability of public services more broadly and the use of eCommerce in addition to eBusiness readiness. The eEurope index also uses the access and use of ICT technology in two components: first, on general level, and secondly, it considers especially the case of broadband. Moreover, the component measuring the security of ICT can also be considered as emphasizing the technological nature of the index. Thus the ICT technology can be interpreted as having the weight of 3/5 (or 9/15) in the calculation of the indicator.

In contrary to the eEurope 2005 index, the NRI puts some weight (1/3) on environmental factors. The NRI also measures readiness by issues related to educational and affordability factors. The technological side of the NRI concentrates on the usage of ICT technology, and misses ICT access indicators. The usage of ICT is measured by the weight of 1/3 (or 5/15). It thus seems that the eEurope index is noticeably more technology-oriented (Bogdanowicz et al. 2003).

The two indices can also be reflected against the presented lifecycle of IS in Figure 1. The NRI clearly measures IS readiness: both the environment and the readiness components can be interpreted to measure this part of the lifecycle (see Figure 3). The eEurope 2005 index, however, does not include readiness except for technological availability. Moreover, the usage component of the NRI is linked to the Intensity phase of the IS lifecycle, as do the technological components (Internet indicators, broadband, security) of the eEurope 2005 index. The eEurope 2005 index indicates the Impact phase by its components measuring modern public services and eBusiness environment. In the NRI such a measure of the Impact phase is missing. Thus the eEurope 2005 index measures the information society from a more advanced point of view, whereas the approach of NRI is more conventional. As a result, the less advanced information societies seem to present a bigger difference between these two indices. This is also supported by the fact that the difference (eEurope-NRI) of these two indices correlates negatively with the indicator readings (eEurope: $p = -0.92$ & NRI: $p = -0.67$), implying that less advanced information societies get relatively better readings by the NRI index.

Map 1 presents the constructed composite IS index. The overall spatial pattern of the IS in Europe is clear: There are north-south and east-west divisions among the European space. As we would expect, northern countries seem to have a more advanced IS compared to the southern countries. Furthermore, the new member countries (including Romania and Bulgaria) seem to lag behind the EU15 countries. However, there are exceptions to this pattern such as Estonia, which seems to be a more advanced IS in comparison to the Mediterranean member countries and new member states.



Map 1. The composite index of the IS in Europe based on eEurope (2004) and NRI (2005).

The index reveals significant differences in terms of IS performance in Europe. This pattern can be interpreted against the lifecycle presented in Figure 1 as follows: the composite index ranging from 0 to 1 can be interpreted to represent a degree of IS maturity. It has to be noted, however, that the indices seem to put more weight on measuring the readiness, use and availability of technology, whereas the impact phase of IS receives lesser weight. This means that the score 1 possibly does not mean a fully implemented IS, and the potential upper limit for the IS development is probably higher than 1. Here, however, 1 is seen as a proxy of the upper limit of IS, and the values of the composite index are used to illustrate the evolutionary stage

of the IS in Europe. A logistic curve with an upper asymptote of 1 was chosen to represent the overall development pattern, and the countries' index scores positions on this standard S-curve were calculated. The 29 European countries are plotted against the IS lifecycle in Figure 5.

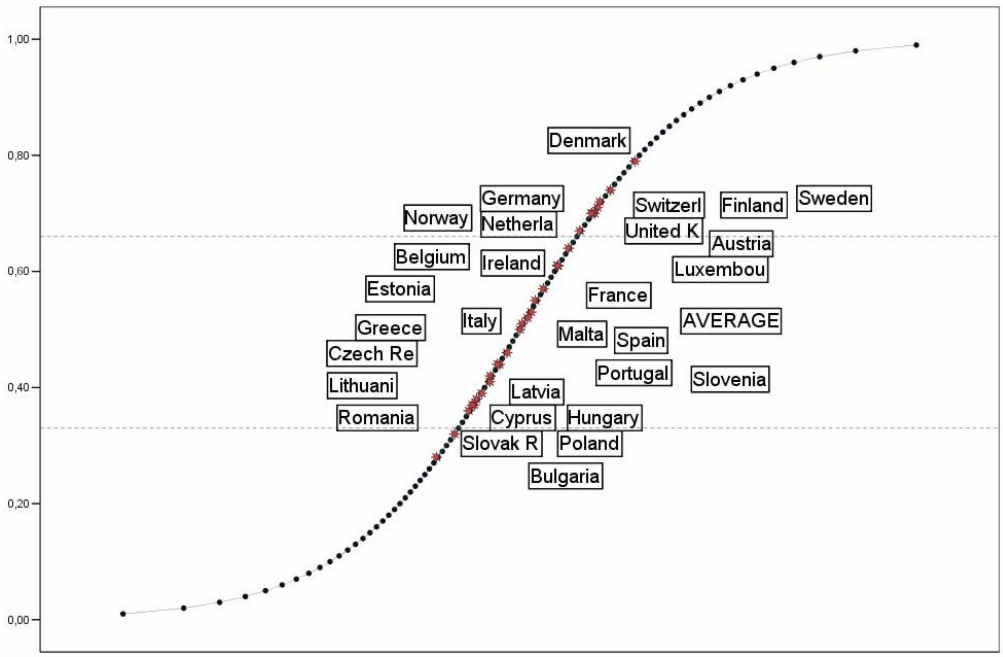


Figure 5. The stages of IS development in Europe.

Figure 5 reveals that the ESPON countries represent a relatively broad range of the IS lifecycle. As the composite index probably has a positive bias, the actual situation might be that the countries are located in all the three stages of the lifecycle concept: readiness, intensity and impact. Generally, the Nordic and northern European countries could be seen to be at the impact stage, whereas, for example, Romania and Bulgaria represent the less developed information societies at the readiness stage.

The fact that the countries are located in multiple stages of the IS lifecycle is challenging from the viewpoint of the eEurope monitoring process. The lifecycle framework implies the collection of different types of indicators at different stages of IS. If the countries are at different stages, this would mean that the set of indicators should be tailored to meet the different information requirements at each stage of the IS cycle. This, of course, has also implications on the overall meaning of benchmarking and comparing such different countries with each other.

Figure 5 shows that the 29 selected European countries represent all three phases of the IS lifecycle framework: readiness, intensity and impact. However, an analysis on the national level assumes that the nation is homogeneous in all respects. It thus only gives an aggregate picture, and does not tell much about the territoriality of IS. Territorial information of IS is certainly of importance in the planning and implementing of policy measures. This starting point led the ESPON 1.2.3. 'Information Society' project to aim at developing a synthetic territorial IS indicator, which was based on the lifecycle framework. The aim of this indicator is to gain territorial information of the current state of the IS below the national level.

The components of the developed synthetic territorial IS indicator are presented below in Figure 6. The synthetic index divides into three main categories following the lifecycle framework: readiness, growth and impact. The main categories are weighed equally in the calculation of the synthetic index as follows: ESPON 123 IS index = 1/3 * IS Readiness + 1/3 * IS Growth + 1/3 * IS Impact. The three main categories are further divided into factor groups, as presented by the framework in Figure 6.

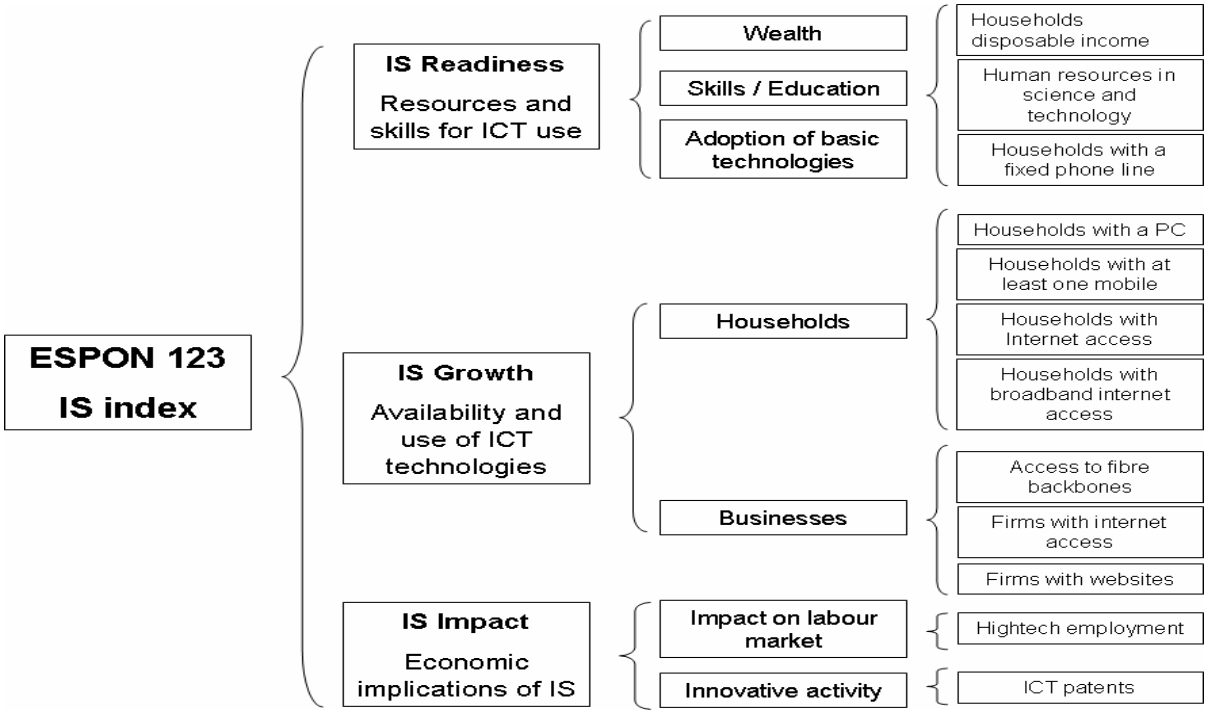


Figure 6. ESPON 123 IS index framework.

Figure 6 shows, that IS readiness is defined as the 'resources and skills for ICT use', and thus consists of the following three factors: wealth, skills and education, and adoption of basic technologies. The definition of IS growth is 'availability and use of ICT' and it is composed of two factor groups: household and business use of ICT. The impact of IS is defined as 'economic implications of IS', and it is measured by two factors: impact on labour market and innovative activity.

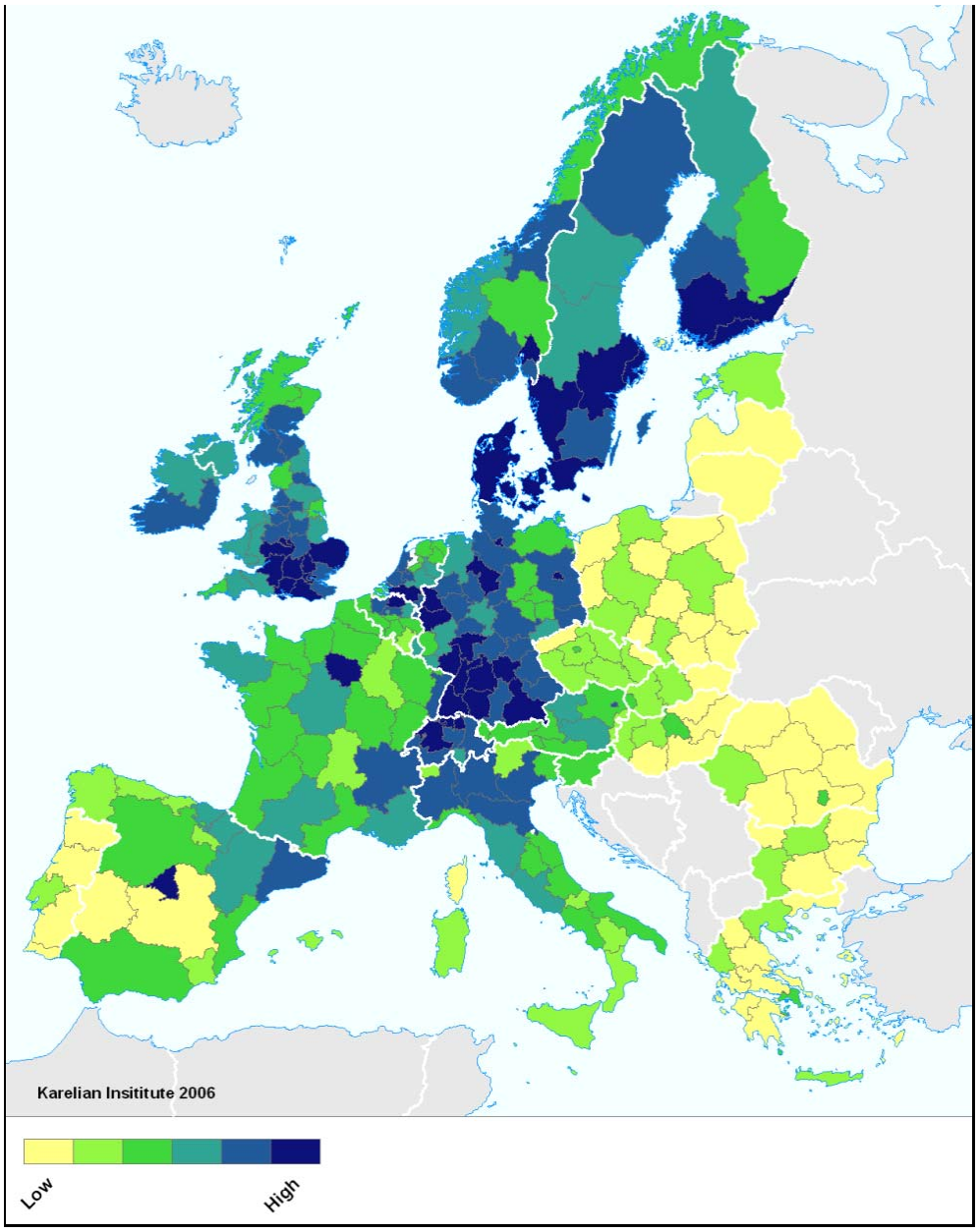
The defined factors are measured by various indicators found available for the NUTS2 regions of the selected 29 European countries. The scarce availability of territorial indicators related to the factors limited the possibilities in calculating the indicator. For example, a recent project investigating the availability of telecoms indicators (ESPON Telecom, see CURDS et al. 2004) found only one territorial data source covering the EU15 countries. The mentioned project thus estimated indicators and used NUTS1 data from the International Telecommunications Union (ITU) for non-EU15 NUTS2 regions. Several indicators provided by the ESPON Telecom -project were used in the calculation of the territorial IS index. As the project provided categorized ICT indicators on the scale from 1 to 6, also the indicators provided by Eurostat were rescaled to fit the same scale by using an equal size in percents as the rule. The average of all indicators belonging to a main category was then calculated, and finally the main categories average was calculated to form the territorial IS index. As the calculated IS index thus is a weighed average of the used indicators, its scale is also from 1 to 6, 1 representing a low end and 6 a high performing IS territory. The indicators and their origins are presented in Table 3.

Table 3. Sources of indicators used for the calculation of the ESPON 123 IS indicator.

Indicator	Year	Source	Origin of data
Disposable household income	2000	Eurostat database	
Human resources in science and technology - education	2004	Eurostat database	
Households with a fixed phone line	2002/2003	Espon 122 typology	INRA (2004) & ITU
Households with a PC	2002/2003	Espon 122 typology	INRA (2004) & ITU
Households with at least one mobile	2002/2003	Espon 122 typology	INRA (2004) & ITU
Households with internet access	2003	Espon 122 typology	estimations
Households with broadband internet access	2002/2003	Espon 122 typology	INRA (2004) & ITU
Access to fibre backbones	2001	Espon 122 typology	estimations
Firms with internet access	2003	Espon 122 typology	estimations
Firms with websites	2003	Espon 122 typology	estimations
Employment in technology and knowledge intensive sectors	2004	Eurostat database	
ICT patent applications	2002	Eurostat database	

As Table 3 shows, additionally to the mentioned estimation and mixed territorial level of some indicators, the used indicators are not from the same point of time. This, of course, sets

limits to the accuracy of the indicator. However, the aim of measuring the state of IS on the NUTS2 level, and to enable the benchmarking of those, can still be achieved. Map 2 displays the calculated IS index (on the scale from 1 to 6) for the NUTS2 regions of the selected 29 European countries.



Map 2. The territorial IS indicator level of the selected European NUTS2 regions.

The information presented by map 2 does clearly give a more detailed view of the information society than map 1. The territorial information society is a more scattered phenomenon if compared to the national state of IS. Some territories located in countries with a lower aggregate IS score performing better than territories located in higher IS score countries can be

found: For example, Madrid has a higher score than Eastern Finland, although Finland is performing better as a nation than Spain.

The calculated territorial IS index seems to measure very much the same as the above presented average national synthetic IS indexes: if the NUTS2 regions scores are weighed by their population, and aggregated to the national level, the ESPON 123 IS index correlates highly positively with both, the eEurope 2005 ($r = 0.916$) and the NRI ($r = 0.891$) indices.

5 CONCLUSIONS

A survey of existing data and indicators on the IS in Europe was presented. It pointed out that their availability sets strict constraints to a quantitative territorial analysis of IS in Europe and formulation of regional typologies for the 29 European countries. The conclusions from the analysis can be summarized in the following two points:

1. The conceptual definition of IS remains unclear. This is seen in the empirical work: unharmonized data collecting formats, diverse number and scope of indicators, and different methodological approaches of collecting data. However, the survey of the recent European IS indicators projects indicates three general operational categories of IS: the narrow technological, the intermediate techno-economic, and the broad all-inclusive definition.
2. European-wide territorial data on IS are scarce, or even totally lacking. Moreover, the available IS data below the NUTS0 level is incomplete for comparisons – in those areas where regional data is available, it covers only a limited subset of the European countries.

While there seems to be a lack of available consistent territorial data on IS, there is plenty of data available on the national level. Recent national synthetic IS indicators combine a number of factors measured by various indicators. The territorial IS indicator developed does also synthesize many factors. It seems to be well in line with the available national IS indicators, and does give additional information about the below national level state of IS.

However, the scarcity of available background data related to IS limits also the calculation of a synthetic territorial IS index. The fact of background indicators being partly from different years, combined sources and results of estimations, decreases the reliability and comparability

of them. As a result, also the overall IS index does probably not give an accurate picture of the state of IS. However, the calculated territorial IS index still manages to give a snapshot of the state of IS in NUTS2 regions, which can be useful in, for example, benchmarking regions.

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APPENDIX 1. LIST AND WEBSITES OF MENTIONED IS PROJECTS.

ESIS: http://www.eu-esis.org/

SIBIS: http://www.sibis-eu.org/

Eurobarometer: http://www.gesis.org/en/data_service/eurobarometer/

Eurostat IS Pocketbook: http://epp.eurostat.cec.eu.int/portal/page?_pageid=1073,46587259&_dad=portal&_schema=PORTAL&p_product_code=KS-56-03-093

E-Business Market Watch: http://www.ebusiness-watch.org/

BISER: http://www.biser-eu.com

INRA: http://europa.eu.int/information_society/policy/ecomm/info_centre/documentation/studies_ext_consult/inra_year2004/index_en.htm

ESPON Telecom: http://www.espon.lu/online/documentation/projects/thematic/1864/fr-1.2.2_revised.pdf

Nordic Statistical Network: http://stat.fi/tk/yr/tietoyhteiskunta/nordic_iss_02.pdf

Statistics Finland: http://www.stat.fi/tk/yr/tietoyhteiskunta/

APPENDIX 2. The eEurope 2005 Index (INSEAD 2004) and The NRI (WEFORUM 2005)

The eEurope 2005 Index is defined as follows: eEurope 2005 Index = 1/5 Internet Indicators + 1/5 Modern Online Public Services + 1/5 Dynamic e-Business environment + 1/5 Secure Information Infrastructure + 1/5 Broadband

A. Internet Indicators Component Index is defined as follows:
Internet Indicators = 1/3 Citizens access and use of Internet + 1/3 Enterprise access to and use of ICT + 1/3 Internet access costs

1. Citizens access and use of Internet sub index is defined by the following data variables:
1.01 Internet access from home, 2002/3
1.02 Regular and occasional Internet Usage, 2002/3
1.03 Intensity of Internet Usage, 2002/3
1.04 E-mail usage, 2002/3
1.05 Internet Users per 100 inhabitants, 2003
1.06 ISDN subscribers per 100 inhabitants, 2003
1.07 Internet usage at home, 2002/3
1.08 Internet usage at work, 2002/3
1.09 Percentage of households online, 2003
1.10 Personal computers per 100 people, 2002

2. Enterprises access to and use of ICT sub index is defined by the following data variables:
2.01 Employees with Internet access, 2002/3
2.02 Business PCs installed per 100 inhabitants, 2002
2.03 Internet hosts per 10000 inhabitants, 2003
2.04 Teleworking usage, 2002/3
2.05 Teleworking intensity, 2002/3
2.06 Competition in the ICT sector, 2003
2.07 ICT market value relative to GDP, 2002

3. Internet access costs is defined by the following variable:
1.01 Cost of 20 hours of Internet use, 2003

B. Modern Online Public Services Component Index is defined as follows:
Modern Online Public Services = 1/3 e-Government + 1/3 e-Learning + 1/3 e-Health

1. e-Government is defined by the following variables:
4.01 Government online presence, 2003
4.02 Online income tax returns, 2002/3
4.03 Online job search, 2002/3
4.04 Online requests for personal documents, 2002/3
4.05 Online book search in public libraries, 2002/3
4.06 Government online services, 2003
4.07 ICT prioritisation by government, 2003
4.08 Government ICT promotion success, 2003

2. e-Learning is defined by the following variables:
5.01 Use of online electronic learning materials, 2002/3
5.02 Use of offline electronic learning materials, 2002/3

3. e-Health is defined by the following variables:
6.01 Health related online searches, 2002/3
6.02 Internet use by the disabled, 2002/3

C. The Dynamic e-Business Environment Component Index is defined as follows:
Dynamic e-Business Environment = 1/2 Buying and Selling Online +1/2 e-Business Readiness
1. Buying and Selling Online is defined by the following variables:
7.01 Individuals making online purchases, 2002/3
7.02 B to B e-Commerce, 2002
7.03 B to C e-Commerce

2. e-Business Readiness is defined by the following variables:
8.01 Laws relating to Information Technology, 2003

D. A Secure Information Infrastructure Component Index consists of the experience Internet users have with respect to ICT security. It is comprised of the following variables:
9.01 Online Privacy, 2002/3
9.02 Secure Online Commerce, 2002/3

E. Broadband Component Index consists of the following variables:
10.01 DSL Broadband Access, 2002/3
10.02 Broadband Users, 2002
10.03 Bandwidth per capita, 2002

The Networked Readiness Index is defined as follows: Networked Readiness Index = 1/3 Environment + 1/3 Readiness + 1/3 Usage

I. The Environment component index is defined as follows: Environment Component = 1/3 Market Environment Subindex + 1/3 Political and Regulatory Environment Subindex + 1/3 Infrastructure Environment Subindex

I.1. Market Environment Subindex is defined by the following variables:
1.01 State of cluster development
1.02 Venture capital availability
1.03 Subsidies for firm-level R&D
1.04 Quality of scientific research institutions
1.05 Availability of scientists and engineers
1.06 Brain drain
1.07 Utility patents
1.08 ICT manufactured exports
1.09 ICT service exports

I.2. Political and Regulatory Environment Subindex is defined by the following variables:
2.01 Overall administrative burden
2.02 Quality of the legal system
2.03 Laws relating to ICT
2.04 Competition in the ISP sector
2.05 Foreign ownership restrictions
2.06 Efficiency of the tax system
2.07 Freedom of the press

I.3. Infrastructure Environment Subindex is defined by the following variables:
3.01 Overall infrastructure quality
3.02 Waiting time for telephone lines
3.03 Telephone mainlines
3.04 Public pay telephones
3.05 Internet servers

II. The Readiness component index is defined as follows:
Readiness Component = 1/3 Individual Readiness Subindex + 1/3 Business Readiness Subindex + 1/3 Government Readiness Subindex

II.1. Individual Readiness Subindex is defined by the following variables:
1.01 Public expenditure on education
1.02 Adult illiteracy
1.03 Tertiary enrollment
1.04 Radios
1.05 Television sets
1.06 Households online
1.07 Quality of math and science education
1.08 Affordability of local fixed line calls
1.09 Affordability of Internet telephone access
1.10 Affordability of Internet service provider fees

II.2. Business Readiness Subindex is defined by the following variables:
2.01 Ease of obtaining telephone lines
2.02 Cost of business phone subscription
2.03 Extent of staff training
2.04 Quality of business schools
2.05 Scientists and engineers in R&D

II.3. Government Readiness Subindex is defined by the following variables:
3.01 Government prioritization of ICT
3.02 Government procurement of ICT
3.03 Government online presence

III. The Usage component index is defined as follows:
Usage Component = 1/3 Individual Usage Subindex +1/3 Business Usage Subindex + 1/3 Government Usage Subindex

III.1. Individual Usage Subindex is defined by the following variables:
1.01 Personal computers
1.02 ISDN subscribers
1.03 Cable television subscribers
1.04 Internet users

III.2. Business Usage Subindex is defined by the following variables:
2.01 Computers installed in businesses
2.02 Firm-level technology absorption
2.03 Prevalence of foreign technology licensing

III.3. Government Usage Subindex is defined by the following variables:
3.01 Government success in ICT promotion
3.02 Government online services